



Serial No.: 10/707,332
Confirmation No.: 1331
Applicant: BYSTEDT, Soren
Atty. Ref.: 00173.0046.PCUS00

REMARKS:

PRIORITY CLAIM

A copy of PCT/SE02/01071 is included herewith, as is a certified copy of Swedish application 0101949.6 thereby perfecting the present Application's priority claim (see relevant portion of 1895.01 immediately below):

1895.01 Handling of and Considerations In the Handling of National Applications Under 35 U.S.C. 371 and 35 U.S.C. 111(a) Continuations and Continuations-In-Part of a PCT Application

CONTINUATION, CIP, OR DIVISION OF INTERNATIONAL APPLICATION FILED UNDER 35 U.S.C. 111(a)

Rather than filing a national stage application, a continuing application (i.e., continuation, C-I-P, or division) under 35 U.S.C. 111(a) of the international application may be filed. Pursuant to 35 U.S.C. 365(c), a regular national application filed under 35 U.S.C. 111(a) and 37 CFR 1.53(b) (not under 37 CFR 1.53(d) or former 37 CFR 1.60 or 1.62) may claim benefit of the filing date of an international application which designates the United States.

A typical time line involving a continuing application filed during the pendency of an international application is illustrated as follows:

The continuing application must be filed before the international application becomes abandoned as to the U.S. as set forth in 37 CFR 1.494 and 1.495. An appropriate sentence (such as "This is a continuation of International Application PCT/EP90/00000, with an international filing date of January 4, 1990, published in English under PCT Article 21(2) and now abandoned.") must appear in the first sentence of the specification. In addition, all other conditions of 35 U.S.C. 120 (such as having at least one common inventor) must be satisfied. *A copy of the international application (and an English translation) may be required by the examiner to perfect the claim for benefit under 35 U.S.C. 120 and 365(c) if necessary, for example, where an intervening reference is found and applied in a rejection of one or more claims.*

A claim for foreign priority under 35 U.S.C. 119(a)-(d) must be made in the continuing application in the same manner as a claim for foreign priority under 35 U.S.C. 365(b) in a national stage application. In the same manner as with a national stage application, a foreign priority claim is proper if (1) a claim for foreign priority was made in the international application, and (2) the foreign application was filed within 12 months prior to the international filing date. A certified copy of any foreign priority document must be provided by the applicant if the parent international application has not entered the national stage under 35 U.S.C. 371 (the photocopy received from the International Bureau cannot be used). If the parent international application has entered the national stage under 35 U.S.C. 371, the applicant, in the continuing application, may state that the priority document is contained in the national stage application.

REMARKS REGARDING CLAIMS AMENDMENTS:

Claim 1 has been amended for clarification to place the present application in condition for allowance.

Claims 1 - 5 are pending in the present application.

IN RESPONSE TO THE OFFICE ACTION:

REJECTION UNDER 35 U.S.C. § 102:

The Office Action indicates rejection of claims 1 - 4 under 35 U.S.C. §102(b) as being anticipated by US Patent No. 6,390,779 of Cunkelman.

The following tabular summary provides at least two ways in which Cunkelman fails to teach requirements of claim 1 of the present invention. Omissions from Cunkelman disqualifies it as an anticipating reference under 35 U.S.C. §102(b).

COMPARISON OF THE PRESENT INVENTION WITH TEACHINGS OF CUNKELMAN

Claims Requirements of the Present Invention	Cunkelman U.S. 6,390,779
Claim 1 recites "a second control member signally connected to a pressure sensor - - - said second control member <u>using said pressure sensor</u> to establish whether the compressor is operating - - ."	Cunkelman uses outputs of sensors, located on and in a compressor to monitor the compressor's condition (see e.g. Column 1, lines 8 - 13).
Claim 1 requires "analysis of recorded pressure and pressure changes in the pressure tank." to indicate the operative condition of the compressor.	Cunkelman monitors pressure signals from multiple sensors (14d, 14e) on a main reservoir and an unloader line and uses data from the sensors to operate a magnet valve 30 (Column 3, lines 56 - 65).

In response to the Office Action applicants have considered the Examiner's selection of Cunkelman (U.S. 6,390,779) but respectfully disagrees that it meets the teaching requirements of an anticipating reference under 35 U.S.C. §102. For anticipation under 35 U.S.C. § 102, "each and every element" of the claimed invention must be found either expressly or inherently described in a single prior art reference. *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987) and references cited therein.

Rejection of claims 1 - 4 of the present invention appears to rely upon figures of the reference of Cunkelman. The Office Action, for example, alleges that "Cunkelman discloses an apparatus for controlling and monitoring an air compressor having a first control member, computer (10) and a second control member, microprocessor (40). Cunkelman discloses a pressure sensor (14) in the main reservoir (e) signally connected to the second control member. The first control member is inherently active when controlling the compressor and passive when not controlling the compressor. Thus, (according to the Office Action) Cunkelman discloses all of the structure claimed by applicant."

However, the Office Action provides no information to identify where each and every element of the claimed invention is found either expressly or inherently described in the applied reference of Cunkelman. It appears that no attempt has been made to address limitations of claims 2 - 4, and it is respectfully asserted that such limitations are not found in Cunkelman.

As indicated in the previous tabular summary, Cunkelman fails to teach at least two limitations of claim 1 of the present invention. Omissions from the reference were evident after careful review, which showed that Figure 1 and Figure 2 of Cunkelman teach the use of sixteen sensors for monitoring various aspects of an air compressor and associated apparatus. Monitoring activities according to Cunkelman differ from the present invention, which uses pressure data from a single sensor to signal the condition of a compressor unit as active or inactive.

Having considered figures of Cunkelman, applicants reviewed the specification of the reference even though the Office Action was silent regarding basis in the specification for rejection of claims of the present invention. Several key teachings of Cunkelman were revealed by this review including that an air compressor arrangement uses sixteen sensors to provide information, "on the operating condition of the air compressor and (such) associated apparatus"

(Column 1, lines 8 - 13). The reference teaches an “intelligent” compressor providing its own diagnostics for an information processor that notes the occurrence of both cut-in and cut-out of the compressor” (Column 1, lines 64 - 67 and Column 2, lines 7 - 11). Cunkelman further teaches a plurality of sensors optionally reactive to temperature, pressure and miscellaneous properties (Column 2, line 66 to column 3, line 2). Of pressure sensing, Cunkelman teaches only that a computer uses pressure data to operate a magnetic valve used to load and unload an air compressor (Column 3, lines 56 - 65).

Regardless of other teachings, Cunkelman exhibits the deficiency referred to in paragraph [0006] of the present application, as filed (also as in published application U.S. 2004/0155055), which states that, “known systems, however, lack the possibility to verify whether or not the compressor is actually supplying the compressed-air tanks in the system.” According to the teachings of Cunkelman, sensor 12 determines the operating condition of the compressor, but does not confirm delivery of compressed gas to the main reservoir. Pressure sensor 14 sends a signal to open or close a magnetic valve 30 but provides no indication that the compressor is in a condition to supply compressed air.

As indicated in the tabular summary, amended claim 1 of the present invention requires “said second control member using said pressure sensor to establish whether the compressor is operating.” The compressor arrangement of Cunkelman is incapable of meeting this requirement. Evidence shows that Cunkelman would need two sensors, i.e. a combination of a compressor condition sensor 12 and pressure sensor 14, to fulfill the role of a pressure sensor according to the present invention. Applicants submit that reduction in the number of sensors provides a patentable improvement over the reference. For this reason, contrary to the Office Action’s allegation, Cunkelman is incapable of satisfying functional requirements of the present invention.

Previous discussion provides evidence that Cunkelman fails to teach limitations of claim 1 and is silent regarding limitations of claims 2 - 4 of the present invention. Therefore, request is respectfully made for reconsideration and withdrawal of the rejection of claims 1-4 under 35 U.S.C. §102(b).

REJECTION OF CLAIMS FOR ALLEGED OBVIOUSNESS TYPE DOUBLE PATENTING:

The Office Action includes provisional rejection of Claims 1-5 under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 2 and 7-10 of co-pending Application No. 10/707334. Applicants submit that the provisional rejection is inappropriate for at least the following reasons:

To avoid joinder of inventions in a single application, 37 CFR 1.141(a) requires that, "Two or more independent and distinct inventions may not be claimed in one national application, - - ." Knowledge of this restriction led to the filing of two applications identified herein by application number 10/707,332 for the present application and application number 10/707,334 that is alleged to contain conflicting claims.

Giving consideration to 35 U.S.C. §101, which has been interpreted as limiting an inventor to only one patent per invention, and 37 CFR 1.141(a) that further emphasizes this requirement, the evidence shows that subject matter claimed by the 10/707,332 application is patentably distinct from that claimed by the 10/707,334 application for at least the following reasons:

1. The 10/707,334 application claims "control of a cooling fan" according to claim 2.
2. Claims 7 - 10 have dependency from claim 2 to address control of the cooling fan at a time when pressure measurements are used to establish the operating condition of the compressor. Although claims 7 - 10 include determination of the operating condition of the compressor and control of the cooling fan to occur together, these system functions are independent of each other.
3. The limitations of claims 7 - 10 operate together with control of the cooling fan, but the claimed invention of the 10/707,334 application still focuses on cooling. This application does not include a claim exclusively addressing a compressor system that has a control member using pressure measurement to establish the operating condition of the compressor. If it included such a claim the 10/707,334 application would violate 35 U.S.C. §101 and 37 CFR 1.141(a).
4. The 10/707,332 and 10/707,334 applications respectively claim a first invention corresponding to a compressor system using a control member responsive to a pressure sensor to establish the operating condition of the compressor (10/707,332) and a second invention

controlling a cooling fan in response to a cooling requirement (10/707,334). Reliance on claims 2 and 7-10 of the 10/707,334 application would leave unclaimed the system that establishes whether or not the compressor is operating regardless of cooling requirements. Clearly these inventions are independent and distinct from one another and satisfy the definitions of "independent and distinct" according to MPEP 802.01. As indicated above, compliance with current laws and regulations requires separate applications to claim the subject matter of each independent and distinct invention.

In view of the above, applicants respectfully request reconsideration and withdrawal of the rejection of claims 1-5 under the judicially created doctrine of obviousness-type double patenting.

CONCLUSION

After review, the prior art made of record and not relied upon is not considered pertinent to applicants' disclosure because none of the references of Matsumoto et al. (U.S. 4,525,125), Smith (U.S. 4,576,552) and Lifson et al. (U.S. 6,210,119) teaches limitations of the present invention that provide differentiation from the applied reference of Cunkelman (U.S. 6,390,779).

Applicants have made an earnest attempt to respond to all the points included in the Office Action and, in view of the above, submit that the application is in condition for allowance. Consequently, request is respectfully made for reconsideration of the application and notification of allowance of claims 1-5 in the next paper from the Office.

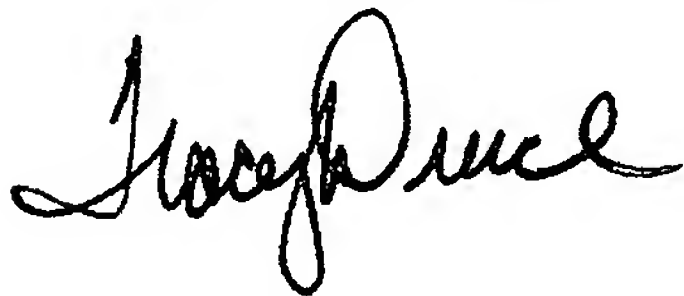
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The undersigned representative requests any extension of time that may be deemed necessary to further the prosecution of this application.

The undersigned representative authorizes the Commissioner to charge any additional fees under 37 C.F.R. 1.16 or 1.17 that may be required, or credit any overpayment, to Deposit Account No. 14-1437, Order No. 00173.0046.PCUS00.

In order to facilitate the resolution of any issues or questions presented by this paper, the Examiner should directly contact the undersigned by phone to further the discussion.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Tracy W. Druce". The signature is fluid and cursive, with the first name "Tracy" and last name "Druce" clearly distinguishable.

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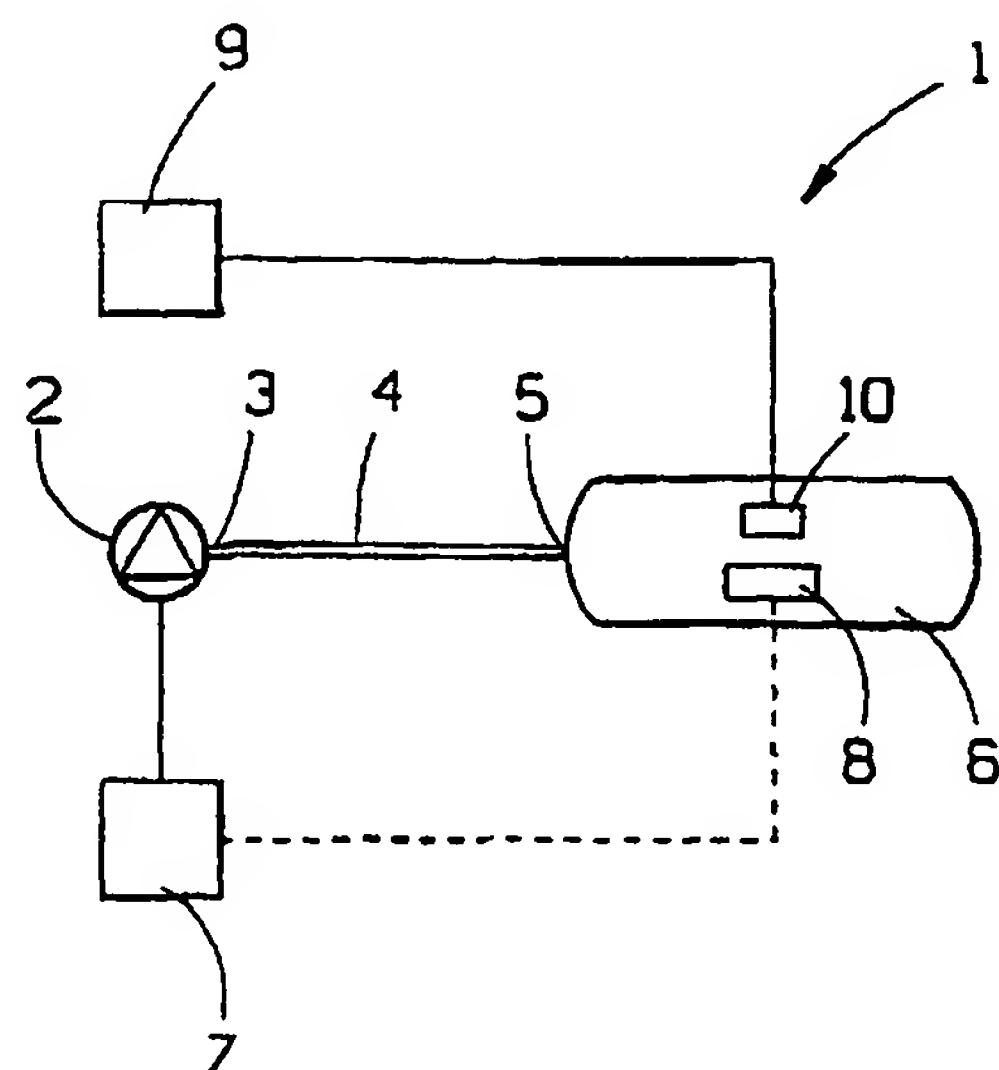
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For two-letter codes and other abbreviations, refer to the "Guid-
ance Notes on Codes and Abbreviations" appearing at the begin-
ning of each regular issue of the PCT Gazette.

(54) Title: SYSTEM FOR SUPPLY OF A PRESSURISED GAS AND METHOD FOR VERIFYING THAT A COMPRESSOR IS
ACTIVE IN A SYSTEM FOR SUPPLY OF A PRESSURISED GAS



(57) Abstract: System for supply of compressed gas, comprising one or more pressure tanks (6), a compressor (2) which can be controlled via first control member (7) and is arranged to supply said pressure tank or pressure tanks (6) with compressed gas, where said first control member (7) is arranged to adopt an active position when the compressor (2) is controlled to operate, whereby compressed gas is delivered to said pressure tanks, and a passive position when the compressor (2) is controlled not to operate.

WO 02/101240 A1

TITLE

System for supply of a pressurised gas and method for verifying that a compressor is active in a system for supply of a pressurised gas.

5

TECHNICAL FIELD

The present invention relates to a system for supply of compressed gas according to the preamble of Patent Claim 1, and to a method for verifying
10 whether a compressor is operating in a system for supply of compressed gas according to the preamble of Patent Claim 5.

PRIOR ART

15 Systems for supply of compressed gas generally comprise a compressor, compressed-air lines and one or more compressed-air tanks which are fed by the compressor. The compressor is usually controlled by a first control member which is arranged to set the compressor to a first, active state when the compressor is operating, i.e. feeding compressed gas to the
20 compressed-air tanks, and to a second, passive state when the compressor is not operating. In known designs, for example as shown in US 4 863 355, the first control member is connected to a pressure sensor connected to said tanks, the first control member setting the compressor to an active or inactive state depending on the pressure measured by the pressure sensor.

25

The prior art thus includes systems for controlling a compressor in a system for supply of compressed gas. Such systems lack the possibility of verifying whether or not the compressor is actually supplying the compressed-air tanks in the system. This means that knowledge of whether the compressor
30 is or is not in working order cannot be gained from the control system since it only sends a signal on activation to the compressor and thereafter ignores

whether compressed gas is being delivered to the pressure tanks or not.

BRIEF DISCLOSURE OF THE INVENTION

- 5 The object of the invention is to make available a system for supply of compressed gas in which it is possible to verify whether a compressor is delivering or is not delivering compressed gas to pressure tanks included in the system. This object is achieved by means of a system for supply of compressed air according to the characterizing clause of Patent Claim 1. By
- 10 virtue of the fact that the system comprises a second control member which is connected in signalling terms to a pressure sensor arranged in said pressure tanks and that said second control member is arranged to establish that the compressor is operating via the pressure recorded by the pressure sensor and the changes in pressure in the pressure tank, it is possible to
- 15 verify whether compressed gas is being delivered to the pressure tanks. According to a preferred embodiment, this knowledge can be used to control a system for cooling of compressed air. According to a second embodiment, this knowledge can also be used to provide information on whether the compressor is in working order, by comparing control instructions from the
- 20 first control member and the second control member, with function errors being found when the first control member indicates that the compressor is active and the second control member indicates that the compressor is passive, or vice versa. According to a third embodiment, this knowledge can also be used as information for preventive maintenance for replacing
- 25 desiccant cartridges in air driers and/or replacing compressors.

Said objects are achieved also by a method according to the characterizing clause of Patent Claim 5.

30 DESCRIPTION OF THE FIGURES

The invention will be described in greater detail below with reference to the attached figures, where

Fig. 1 shows a diagrammatic representation of a system for supply of
5 compressed gas,

Fig. 2 shows a diagrammatic representation of a method for establishing
whether or not a compressor in a system for supply of compressed
gas is operating or not,

10

Fig. 3 shows a diagrammatic representation of a system for cooling of
compressed air by fan control, where a system for supply of
compressed gas according to the invention is used,

15 Fig. 4 shows a diagrammatic representation of a method for establishing
cooling requirements, and

Fig. 5 shows a diagrammatic representation of an alternative method for
establishing cooling requirements.

20

ILLUSTRATIVE EMBODIMENTS

Figure 1 is a diagrammatic representation of a system for supply of
compressed gas. The system comprises a compressor 2 which is of a
25 conventional type and will therefore not be described in any more detail
here. The compressor 2 has an outlet port 3 to which a gas line 4 is coupled.
The compressed-air line connects said outlet port 3 to the inlet port 5 to one
or more pressure tanks 6. Between said outlet port of the compressor 2 and
the inlet port 5 of the pressure tank or pressure tanks 6 it is possible for one
30 or more active components to be connected, for example an air drier. The
system further comprises a first control member 7 which is arranged to

control the compressor 6 in a conventional manner. The first control unit is of a conventional type and will therefore not be described in any more detail here; it can, for example, be designed as is described in any of the following documents – Japanese Utility Model Public Disclosure No. 59-14891 (1984),
5 Japanese Patent Laid-Open No. 158392 (1984) or US Patent No. 4 863 355. As is indicated in Figure 1, the first control member can therefore be connected to a pressure sensor 8 arranged on said pressure tank or pressure tanks 6.

10 The first control member is thus arranged to adopt an active position when the compressor is controlled to operate whereby compressed gas is delivered to said pressure tanks, and a passive position when the compressor is controlled not to operate. The compressor 2 is thus designed on the one hand to operate in an active operational mode when the
15 compressor is supplying the compressed-air system with compressed air, and on the other hand to be disengaged or inactive when the compressor is not supplying the system. This can be achieved in a number of ways well known to the skilled person. According to one embodiment, a valve can be opened between cylinder spaces located in the compressor, the volumetric
20 efficiency of the compressor thus falling and the compressor in this state being unable to generate compressed air with a pressure exceeding the system pressure. According to a second embodiment, a valve connecting the cylinder spaces of the compressor to the surrounding atmosphere is opened. A third possibility is to drive the compressor via a disengageable
25 transmission.

The system further comprises a second control member 9 which is connected in signalling terms to a pressure sensor 10 arranged in the pressure tank or pressure tanks 6. The pressure sensor 10 can consist of
30 the pressure sensor which is used for the first control member or, alternatively, it can be a separate pressure sensor. In a preferred

embodiment, a separate pressure sensor is used, which increases the reliability of the verification of whether or not there are errors in the system.

The second control member 9 is arranged to establish that the compressor is
5 operating by means of the pressure recorded by the pressure sensor and the changes in pressure in the pressure tank, as will be described below.

The second control member, without actually generating control signals to the compressor, thus establishes that the latter is operating by virtue of a
10 pressure sensor 10, which is mounted in the pressure tank, recording the pressure and pressure changes in the pressure tank 6. This is achieved by the fact that the second control member 9 establishes that the compressor 2 is operating when said pressure sensor 10 records a pressure in the pressure tank 6 below a first limit value; that the second control member 9
15 establishes that the compressor is not operating when said pressure sensor 10 records a pressure in the pressure tank 6 above a second limit value, and that the second control member 9 establishes that the compressor 2 is operating when said pressure sensor 10 records a pressure in the pressure tank 6 between said first and second limit values and the sensor 10 records
20 that the pressure is rising, and that the second control member 9 establishes that the compressor 2 is not operating when said pressure sensor 10 records a pressure in the pressure tank 6 between said first and second limit values and the sensor records that the pressure is dropping or is constant. According to one embodiment of the invention, the control member is also
25 arranged to establish that there is a risk of a function error if the pressure does not rise above a lower limit value and that an error exists if the pressure rises above an upper limit value.

Figure 2 is a diagrammatic representation of a method of determining
30 whether the compressor 2 is or is not driven in an active position when the compressor is feeding air to a pressure tank 6. A first step 40 determines

whether the pressure in the pressure tank is above a first limit value P_{\max} . If such is the case, the compressor is inactive. A second step 41 determines if the pressure is below a second limit value P_{\min} . If such is the case, the compressor is active. In a third step 42, it is noted if the pressure in the tank
5 is rising. If such is the case, the compressor is active. Otherwise, the compressor is inactive.

Figure 3 is a diagrammatic representation of a system for cooling of compressed air by means of fan control, with a system for supply of
10 compressed gas according to the invention being used. The system comprises a compressor 2 which is of a conventional type and will therefore not be described in any detail here. The compressor 2 has an outlet port 3 to which a compressed-air line 4 is coupled. The compressed-air line connects said outlet port to an inlet port 11 of a first active component 12. The first
15 active component 12 preferably consists of an air drier. The air drier 12 also has a first outlet port 13 to which a second compressed-air line 14 is connected. The second compressed-air line 14 connects the air drier 12 to an inlet port 5 of a pressure tank 6. The pressure tank 6 thereafter supplies a set of air consumers (not shown). In an alternative embodiment, the first
20 active component consists of a circuit distribution valve, which divides the compressed-air system into two or more separate circuits. The system for supply of compressed air can also include more than one pressure tank. In the illustrative embodiment shown, the air drier 12 also has a second outlet port 15 which, via a third compressed-air line 16, is connected to the
25 disengagement mechanism of the compressor 2 and operates as a means of communicating a pneumatic signal to said disengagement mechanism.

The system for supply of compressed air also has a controllable fan 17. The fan is controlled by a control unit 18. The control of the fan 17 is such that
30 the fan 17 can at least be turned on and off, alternatively the control can be such that the speed of rotation of the fan can be controlled. According to one

embodiment of the invention, the fan 17 is driven by a speed-regulated electric motor, but it can also be mechanically coupled via a variable transmission to a motor of another type, for example a combustion engine 20. The variable transmission can be designed in a manner well known to
5 the skilled person; for example the speed of rotation can be controlled via a viscose clutch which connects a power outlet from the motor 20 to the axis of rotation of the fan 17.

In the illustrative embodiment shown, the fan 17 is a controllable fan which is
10 included in the cooling system of the combustion engine 20. The cooling system comprises a set of cooling channels (not shown) arranged inside the combustion engine, inlet and outlet channels 18 which lead the coolant fluid from the combustion engine 20 to a radiator 19. The cooling system also generally comprises a pump 21 mounted in an inlet channel. The fan 17 is
15 preferably mounted downstream of the cooler 19, which means that, if the system is mounted on a vehicle, the oncoming wind exerts a cooling effect on the radiator 19.

The compressed-air line 4, which connects the compressor 2 to the first
20 active component 12, is placed so that it extends past the stream of air generated by the fan 17, which means that the fan is able to cool the air compressed by the compressor and thus heated before it reaches the first active component 12. The compressed-air line 4 is preferably placed in such a way that it has a continuously falling path between the outlet port 3 of the
25 compressor and the inlet port 11 of the first active component. This means that there are no pockets in which water can gather, and in this way the formation of ice plugs is avoided in cold weather. Continuously falling path is intended to signify that, when mounted on a flat base, the perpendicular distance between the flat base and the line decreases along the path from
30 the outlet port 3 to the inlet port 11.

The control unit 18 is further arranged to establish cooling requirements for the compressed air delivered by the compressor 2 and to generate an activation signal for the controllable fan 17 when there is a cooling requirement, said first active component being protected from thermal
5 overload by compressed air fed from the compressor.

The cooling requirement for the compressed-air line is calculated from information concerning the operational status of the compressor 2. This information includes information on whether the compressor is active or not,
10 active meaning that the compressor is supplying the compressed-air system with air. Information on the speed of rotation of the compressor is also used since the temperature of the compressed air rises with increased speed of rotation.

15 The compressor 2 is thus designed on the one hand to operate in an active operating mode in which the compressor supplies the compressed-air system with compressed air and on the other hand to be disengaged or inactive when the compressor is not supplying the system. This can be done in a number of ways well known to the skilled person. According to one
20 embodiment, a valve can be opened between cylinder spaces located in the compressor, in which case the volumetric efficiency of the compressor decreases and the compressor in this state is unable to generate compressed air with a pressure which is above the system pressure. According to a second embodiment, a valve connecting the cylinder spaces
25 of the compressor to the surrounding atmosphere is opened. A third possibility is to drive the compressor via a disengageable transmission.

The control unit 18 comprises a second control member 9 in accordance with what has been described above, which, without actually generating control
30 signals to the compressor, establishes that the latter is operating by means of a pressure sensor 10, which is mounted in the pressure tank 6, recording

the pressure and the changes in pressure in the pressure tank 6. This is achieved by the fact that the control unit establishes that the compressor is operating when said pressure sensor records a pressure in the pressure tank below a first limit value; that the control unit establishes that the compressor is not operating when said pressure sensor records a pressure in the pressure tank above a second limit value, and that the control unit establishes that the compressor is operating when said pressure sensor records a pressure in the pressure tank between said first and second limit values and the sensor records that the pressure is rising, and that the control unit establishes that the compressor is not operating when said pressure sensor records a pressure in the pressure tank between said first and second limit values and the sensor records that the pressure is dropping or is constant.

Figure 4 is a diagrammatic representation of the steps which, according to one embodiment of the invention, are gone through in order to establish whether or not there is a cooling requirement. A first method step 30 establishes whether the compressor 2 is feeding air to the system or not. If the compressor is not operating, there is no cooling requirement. A second step 31 determines whether the speed of rotation of the compressor exceeds a certain limit value. In one embodiment in which the compressor is driven by a combustion engine, the speed of rotation of the combustion engine is noted and cooling requirements may exist if the speed of rotation exceeds the idling speed of the combustion engine, which corresponds to a speed of about 700 rpm. A third step 32 determines whether the external temperature exceeds a certain limit value. A cooling requirement exists only if the external temperature exceeds this limit value. According to one embodiment, this limit value is set at 0°C. A fourth step 33 determines whether a vehicle in which the compressed-air system is mounted is being driven forwards at a speed in excess of a limit value. A cooling requirement exists only if the speed is below this limit value. According to one embodiment, the limit value

is set at 50 km/h. When the checks according to steps one through to four have been carried out and the responses have been in the affirmative, the control unit, in a fifth step 34, generates an activation signal for the electrically controlled fan.

5

Figure 5 shows an alternative embodiment for establishing whether or not there is a cooling requirement. A first method step 30 establishes whether the compressor 2 is feeding air to the system or not. This can be established by one of the methods indicated above. If the compressor is not operating,
10 there is no cooling requirement. A second step 31 determines whether the speed of rotation of the compressor exceeds a certain limit value. In one embodiment in which the compressor is driven by a combustion engine, the speed of rotation of the combustion engine is noted and cooling requirements may exist if the speed of rotation exceeds the idling speed of
15 the combustion engine, which corresponds to a speed of about 700 rpm. In a third step 35, the parameters of external temperature T and vehicle speed are used as input data for a control function for the parameters of speed and external temperature. Depending on the combination of these two values, an output signal is generated which indicates whether or not there is a cooling
20 requirement. In a fourth step 36, the control unit 18 generates an activation signal for the controllable fan if there is a cooling requirement.

The invention is not limited to the embodiments shown above and instead can be varied within the scope of the attached patent claims.

PATENT CLAIMS

1. System for supply of compressed gas, comprising one or more pressure tanks (6), a compressor (2) which can be controlled via first control member (7) and is arranged to supply said pressure tank or pressure tanks (6) with compressed gas, where the first control member (7) is arranged to adopt an active state when the compressor (2) is controlled to operate whereby compressed gas is delivered to said pressure tank or pressure tanks (6), and a passive state when the compressor (2) is controlled not to operate, characterized in that the system comprises a second control member (9) which is connected in signalling terms to a pressure sensor (10) arranged in said pressure tank or pressure tanks (6), and in that the second control member (9) is arranged to establish that the compressor (2) is operating by analysis of the, by the pressure sensor (10), recorded pressure and pressure changes in the pressure tank or pressure tanks (6).
2. System for supply of compressed gas according to Patent Claim 1, characterized in that the second control member (9) is arranged to establish that the compressor (2) is operating when the pressure sensor (10) records a pressure below a first limit value.
3. System for supply of compressed gas according to Patent Claim 1 or 2, characterized in that the second control member (9) is arranged to establish that the compressor (2) is not operating when the pressure sensor (10) records a pressure above a second limit value.
4. System for supply of compressed gas according to Patent Claim 2 or 3, characterized in that the second control member (9) is arranged to establish that the compressor (2) is operating when said pressure

sensor (10) records a pressure between said first and second limit values and the sensor (10) records that the pressure is rising, and in that the second control member (9) is arranged to establish that the compressor (2) is not operating when the pressure sensor (10) records a pressure between said first and second limit values and the sensor (10) records that the pressure is dropping or is constant.

5. Method for verifying whether a compressor (2) is operating in a system for supply of compressed gas comprising one or more pressure tanks (6), a compressor (2) which can be controlled via first control member (7) and is arranged to supply said pressure tank or pressure tanks (6) with compressed gas, where the first control member (7) is arranged to adopt an active state when the compressor (2) is controlled to operate whereby compressed gas is delivered to said pressure tank or pressure tanks (6), and a passive state when the compressor (2) is controlled not to operate, characterized in that a second control member (9) which is connected in signalling terms to a pressure sensor (10) records the pressure and changes in pressure in the pressure tank or pressure tanks (6);
- the second control member (9) establishing that the compressor (2) is operating when the pressure sensor (10) records a pressure below a first limit value,
- the second control member (9) establishing that the compressor (2) is not operating when the pressure sensor (10) records a pressure above a second limit value,
- the second control member (9) establishing that the compressor (2) is operating when the pressure sensor (10) records a pressure between said first and second limit values and the sensor (10) records that the pressure is rising, and
- the second control member (9) establishing that the compressor (2) is not operating when the pressure sensor (10) records a pressure

between said first and second limit values and the sensor (10) records that the pressure is dropping or is constant.

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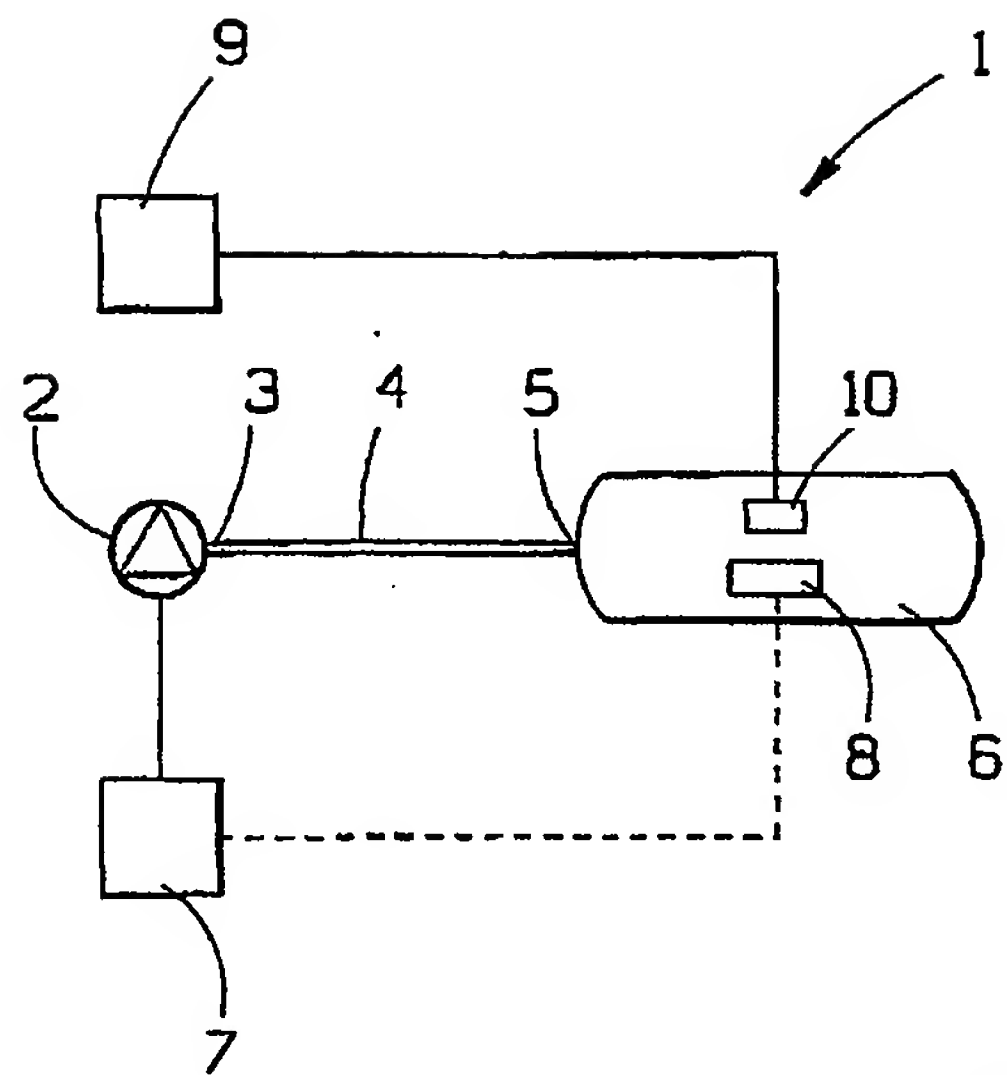


FIG.1

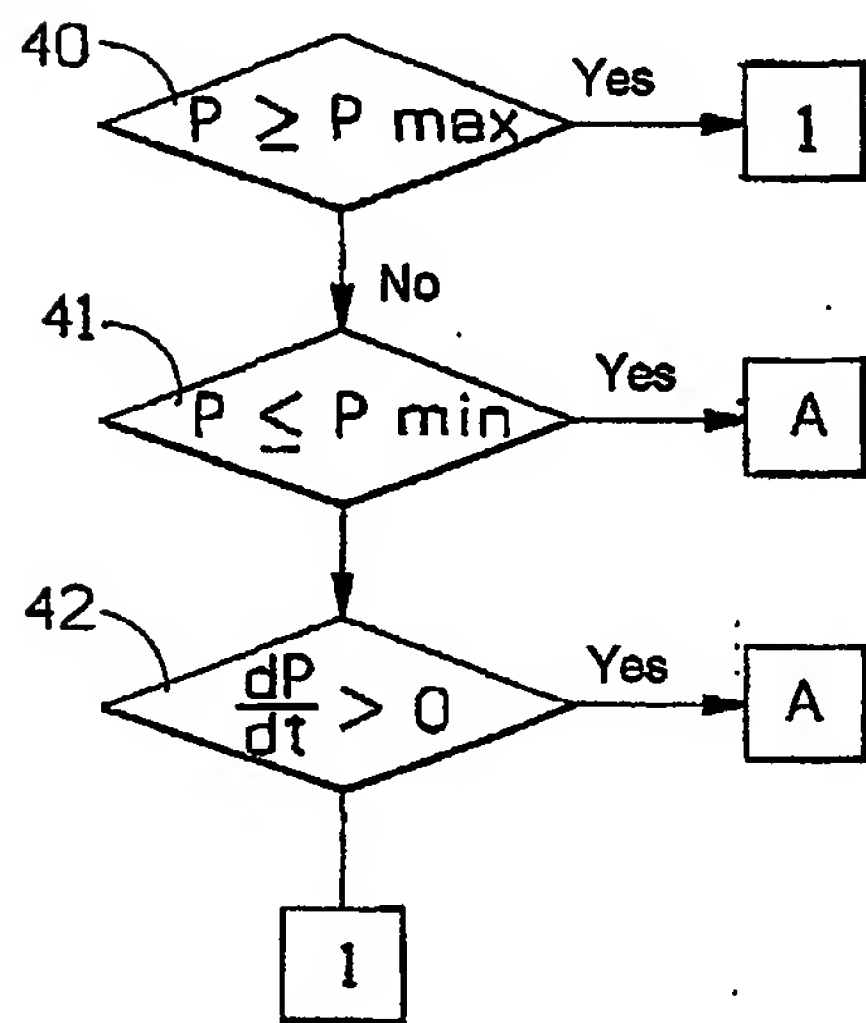


FIG.2

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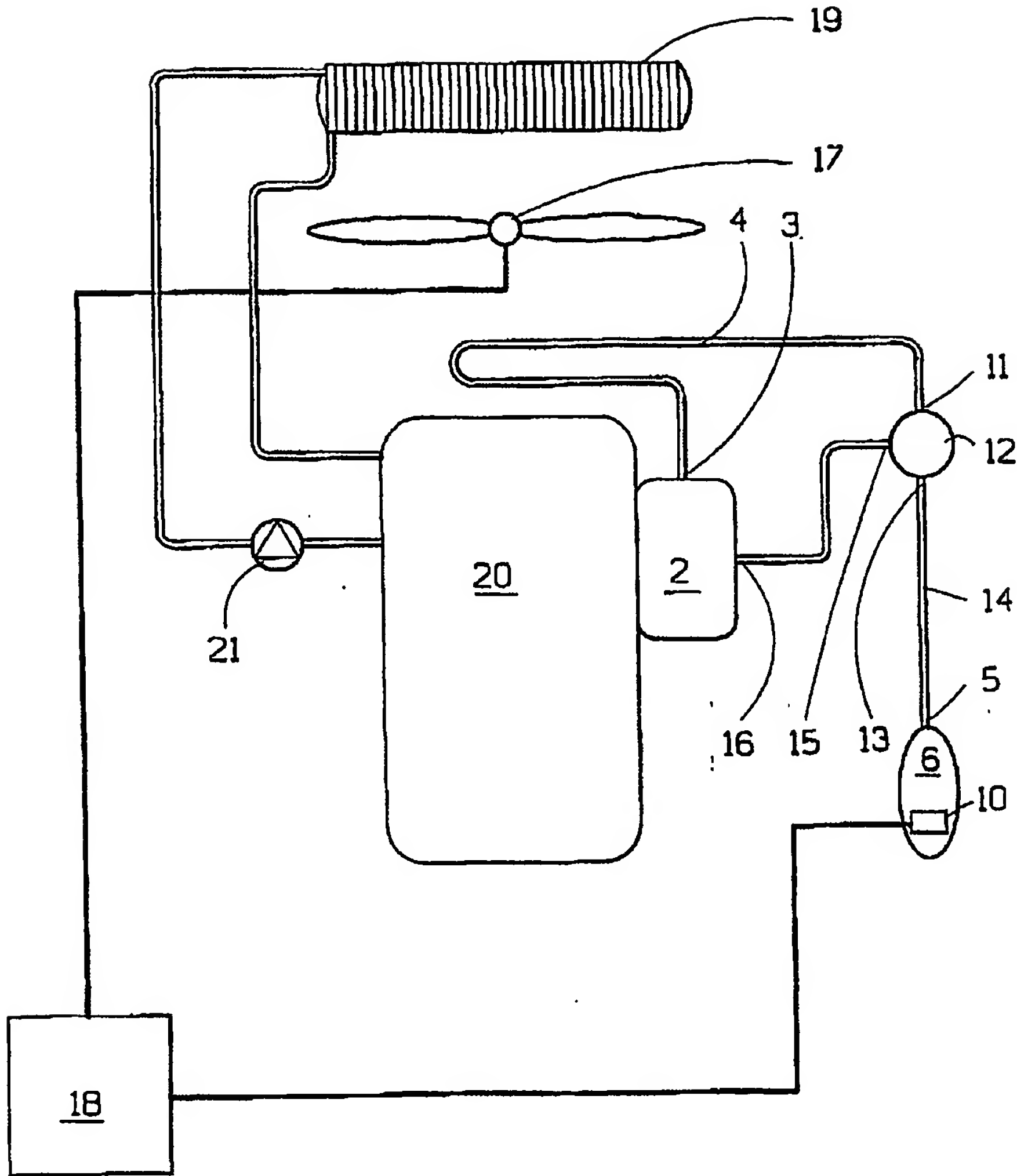
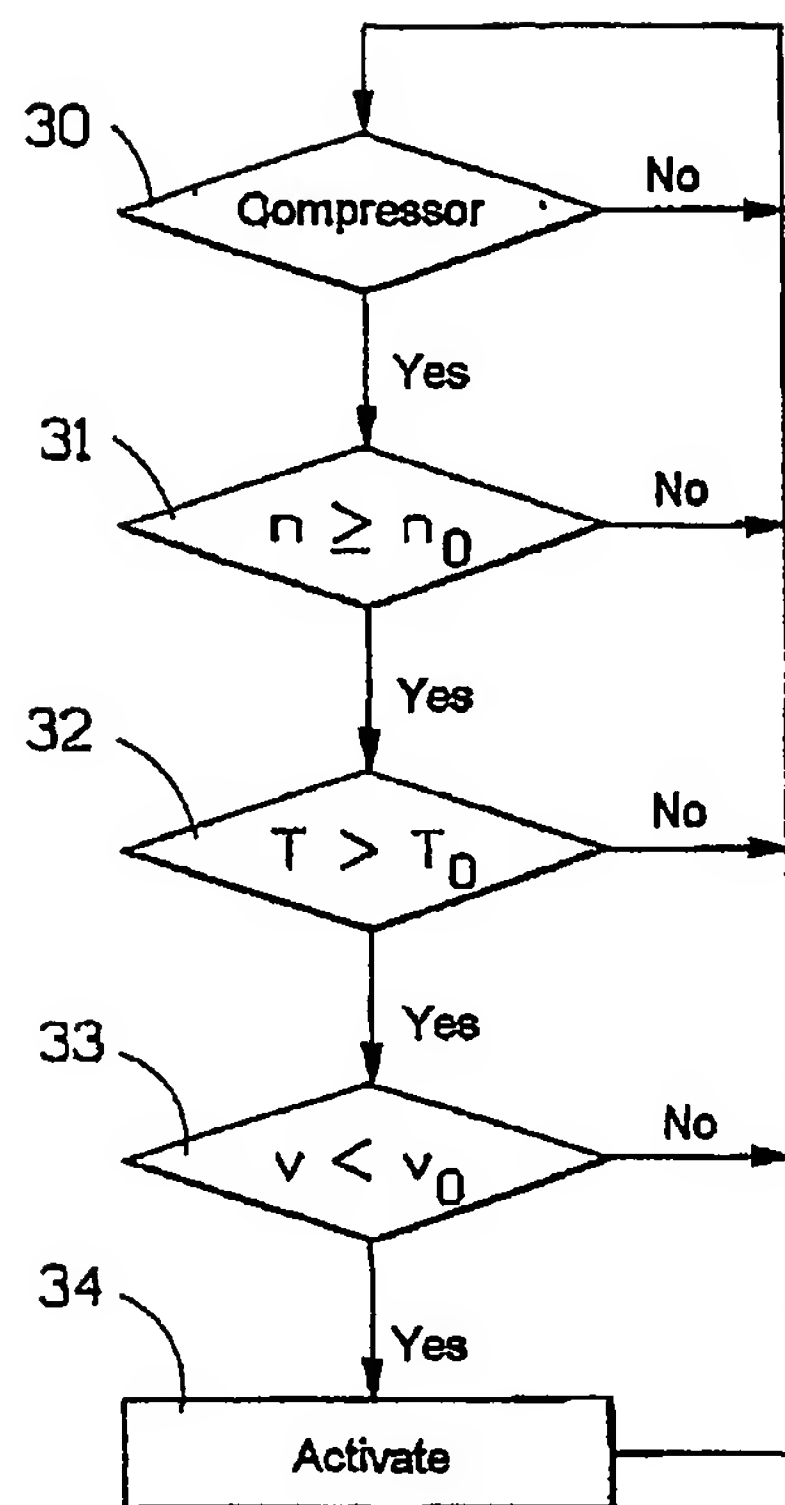
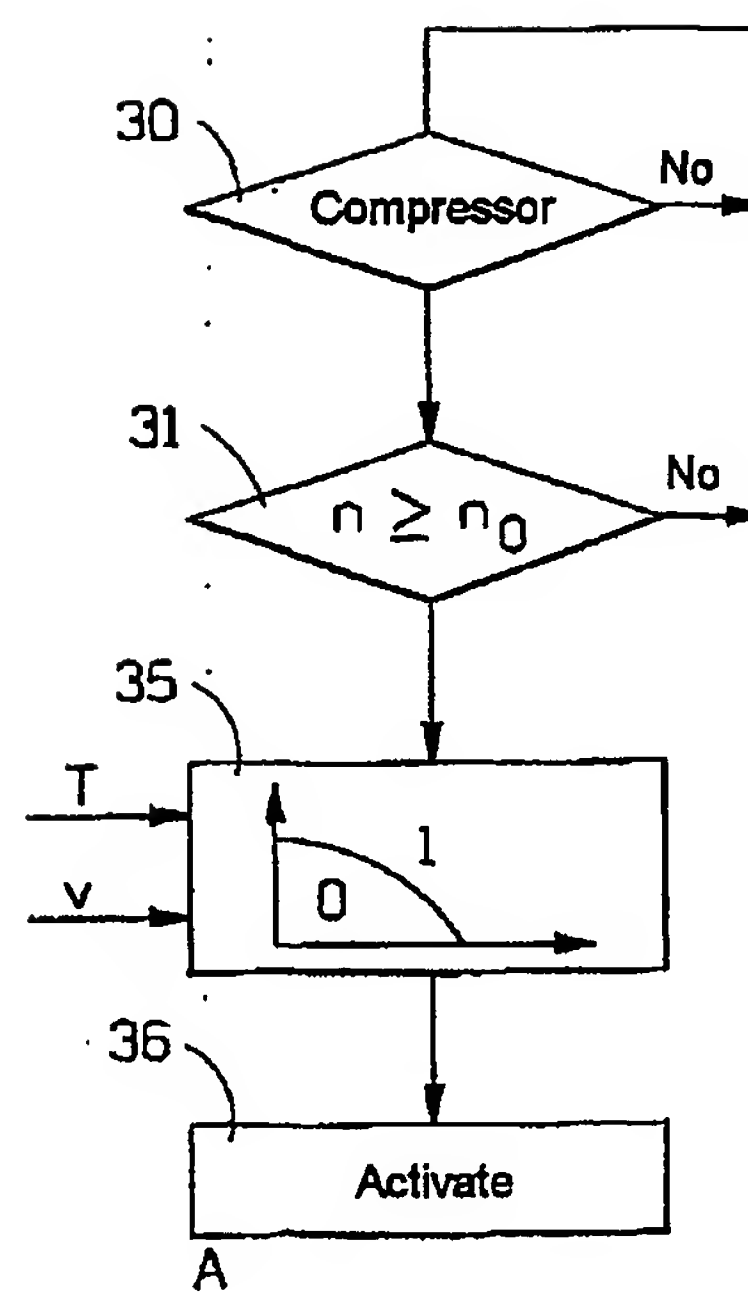


FIG.3

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FIG. 4FIG. 5

INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 02/01071

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: F04B 41/02 // F04B 4902, F04B 39/16, B60T 17/00
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: F04B, B60T

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-INTERNAL, WPI DATA, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0191150 A1 (KNORR-BREMSE AG), 20 August 1986 (20.08.86) --	
A	US 3860363 A (SILVERN ET AL), 14 January 1975 (14.01.75) --	
A	US 4863355 A (ODAGIRI ET AL), 5 Sept 1989 (05.09.89) --	
A	US 5592754 A (KRIEDER ET AL), 14 January 1997 (14.01.97) -- -----	

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:

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Date of the actual completion of the international search

30 August 2002

Date of mailing of the international search report

10-09-2002

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INTERNATIONAL SEARCH REPORT
Information on patent family members

06/07/02

International application No.
PCT/SE 02/01071

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US	4863355	A	05/09/89	JP 1940922 C JP 6063504 B JP 63235677 A JP 63235678 A	23/06/95 22/08/94 30/09/88 30/09/88
US	5592754	A	14/01/97	NONE	